L Number	Hits	Search Text	DB	Time stamp
1	2	6650902.pn.	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/03/20 19:49
2	1614	((receiv$5 or retriev$5 or obtain$5) near5 (data or parameter or information or profile or address or name or 'ringing tone') near5 (telephone or phone or cell or mobile or cellular or wireless or radio or portable)) with (associat$5 or relat$3) with number	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/03/20 19:54
3	78	(((receiv$5 or retriev$5 or obtain$5) near5 (data or parameter or information or profile or address or name or 'ringing tone') near5 (telephone or phone or cell or mobile or cellular or wireless or radio or portable)) with (associat$5 or relat$3) with number) same (stored or located or found or match$3 or available) near5 (database or list or contact or (address adj1 book) or (appointment adj1 book))	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/03/20 19:56
5	659	379/354.ccls.	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/03/20 20:23
6	2	((((receiv$5 or retriev$5 or obtain$5) near5 (data or parameter or information or profile or address or name or 'ringing tone') near5 (telephone or phone or cell or mobile or cellular or wireless or radio or portable)) with (associat$5 or relat$3) with number) same (stored or located or found or match$3 or available) near5 (database or list or contact or (address adj1 book) or (appointment adj1 book))) and 379/354.ccls.	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/03/20 20:56
7	15	((telephone or phone) adj1 number) with 'vCard'	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/03/20 21:10
8	1185	709/230.ccls.	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/03/20 21:03
9	1	(((telephone or phone) adj1 number) with 'vCard') and 709/230.ccls.	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/03/20 21:03
10	367	719/318.ccls.	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/03/20 21:11
12	16	(browser same (identi$6 or 'ID') same database same (mobile or wireless or radio)).ab.	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/03/20 21:12
14	5	browser same ((caller or 'calling party') adj (identi$6 or 'ID')) same database same (mobile or wireless or radio)	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/03/20 21:13

15	1	719/318.ccls. and (browser same ((caller or 'calling party') adj (identi$6 or 'ID')) same database same (mobile or wireless or radio))	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/03/20 21:13
16	386	455/556.1.ccls.	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/03/20 21:14
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-	326983	455/405, 406, 408, 412.1, 412.2, 414.1, 415.ccls.	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/03/19 19:51
-	149	browser same (identi$6 or 'ID') same database same (mobile or wireless or radio)	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/03/19 19:53
-	27	(455/405, 406, 408, 412.1, 412.2, 414.1, 415.ccls.) and (browser same (identi$6 or 'ID') same database same (mobile or wireless or radio))	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/03/19 19:53
-	16	(browser same (identi$6 or 'ID') same database same (mobile or wireless or radio)).ab.	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/03/20 21:12
-	5	browser same ((caller or 'calling party') adj (identi$6 or 'ID')) same database same (mobile or wireless or radio)	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/03/20 21:13
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-	2	(('no' or 'not') near2 match) same (wait$3 with (connection or session))	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/03/20 15:25
-	43943	('no' or 'not') near2 (match or stor$3)	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/03/20 15:26
-	84031	(wait$3 or request$3) with (connect$3 or session)	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/03/20 15:27
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-	56	(('no' or 'not') near2 (match or stor$3)) with ((wait$3 or request$3) with (connect$3 or session))	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/03/20 15:27
-	15	((('no' or 'not') near2 (match or stor$3)) same ((wait$3 or request$3) with (connect$3 or session))) and 455/$.ccls.	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/03/20 15:44
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-	1664760	(data or address or name or 'ring tone data' or profile) with ((('no' or 'not') near (found or available or stored)) or unavailable)	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/03/20 18:07
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-	0	((data or address or name or 'ring tone data' or profile) with ((('no' or 'not') near (found or available or stored)) or unavailable)) with (((establish$3 or make) near2 (connection or request)) with (obtain$3 or retriev$2))	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/03/20 16:27
-	3	((data or address or name or 'ring tone data' or profile) with ((('no' or 'not') near (found or available or stored)) or unavailable)) same (((establish$3 or make) near2 (connection or request)) with (obtain$3 or retriev$2))	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/03/20 16:34
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-	32	(data or address or name or 'ring tone data' or profile) near ((('no' or 'not') near (found or available or stored)) or unavailable) with search$3	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/03/20 17:04
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-	33147	(retriev$3 or search$3 or surf$3 or quer$3) near3 (internet or website or webpage or server)	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/03/20 18:02
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-	27	5777989.URPN.	USPAT	2004/03/20 18:00
-	10011	((retriev$3 or search$3 or surf$3 or quer$3) near3 (internet or website or webpage or server)).ab.	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/03/20 18:03
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-	4107	(request$3 near2 (data or address or name or 'ring tone data' or profile) with server).ab.	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/03/20 18:09
-	22	((request$3 near2 (data or address or name or 'ring tone data' or profile) with server).ab.) and 455/$.ccls.	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/03/20 18:09
-	2	"20020032735"	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2004/03/20 19:46

US006697484B1

(12) **United States Patent**
Fleming, III

(10) **Patent No.: US 6,697,484 B1**
(45) **Date of Patent: Feb. 24, 2004**

(54) **METHOD OF PROGRAMMING TELEPHONE NUMBERS AND IDENTIFIERS IN A TELEPHONE**

(75) Inventor: **Hoyt A. Fleming, III**, Boise, ID (US)

(73) Assignee: **Micron Technology, LLC**, Boise, ID (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **09/217,254**

(22) Filed: **Dec. 21, 1998**

(51) **Int. Cl.**[7] **H04M 1/00**; H04M 3/00

(52) **U.S. Cl.** **379/354**; 379/142.04; 379/142.06; 379/142.15; 379/93.24; 379/93.25; 455/415; 455/418

(58) **Field of Search** 379/354, 70, 88.19, 379/88.15, 142.04, 142.06, 207.15, 142.15, 93.25, 93.24; 455/415, 418, 564

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,062,132	A		10/1991	Yasuda et al.
5,109,403	A		4/1992	Sutphin
5,247,565	A		9/1993	Joglekar et al.
5,247,700	A		9/1993	Wohl et al.
5,339,352	A		8/1994	Armstrong et al.
5,452,346	A	*	9/1995	Miyamoto 379/142.04
5,457,732	A		10/1995	Goldberg
5,485,505	A		1/1996	Norman et al.
5,561,705	A		10/1996	Allard et al.
5,568,546	A		10/1996	Marutiak
5,689,547	A		11/1997	Mölne
5,722,084	A		2/1998	Chakrin et al.
5,737,700	A		4/1998	Cox et al.
5,764,731	A	*	6/1998	Yablon 379/88.15
5,768,362	A		6/1998	Moon
5,797,098	A		8/1998	Schroeder et al.
5,828,956	A		10/1998	Shirai
5,930,703	A		7/1999	Cairns
5,940,484	A	*	8/1999	DeFazio et al. 379/142.06
5,940,752	A		8/1999	Henrick
5,974,312	A		10/1999	Hayes, Jr. et al.
5,995,826	A		11/1999	Cox et al.

(List continued on next page.)

FOREIGN PATENT DOCUMENTS

JP	04126433	A *	4/1992	..... H04M/1/65
WO	WO 94/30023		12/1994	

OTHER PUBLICATIONS

Mobile Office DI 27. Mobile Office DI 27 for GSM 1900. http://www.ericsson.se/US/phones/data/dpy90131.htm (Nov. 15, 1998).

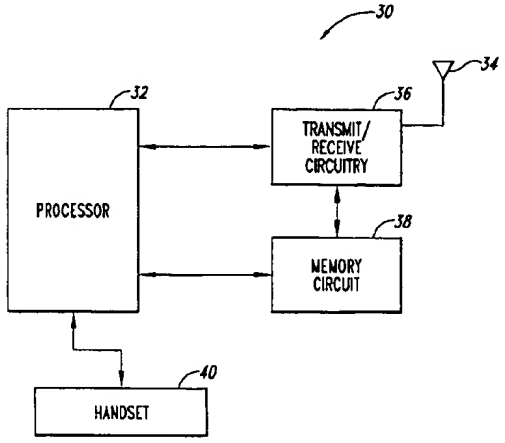
(List continued on next page.)

Primary Examiner—Xu Mei
Assistant Examiner—Con P. Tran
(74) *Attorney, Agent, or Firm*—Perkins Coie LLP

(57) **ABSTRACT**

A method and telephone apparatus that detects an incoming telephone call and determines if the telephone number of the call's originator has previously been stored in the memory of the telephone is provided. If the originator's telephone number has not been previously stored, it is stored into the memory of the telephone. In addition, if an alphanumeric identifier associated with the originator's telephone number was received with the originator's telephone number, it is also stored into memory. If the alphanumeric identifier was not received, the telephone automatically initiates a call to a remote computer and transmits the telephone number of the originator to the remote computer. The computer assigns an alphanumeric identifier to the telephone number and transmits the alphanumeric identifier back to the telephone which stores the alphanumeric identifier in the telephone memory in association with the telephone number. Accordingly, the telephone number can later be recalled and dialed through the use of the alphanumeric identifiers.

52 Claims, 7 Drawing Sheets



U.S. PATENT DOCUMENTS

6,049,796	A		4/2000	Siitonen et al.
6,081,583	A	*	6/2000	Cheng et al. 379/88.2
6,122,347	A	*	9/2000	Borland 379/70
6,122,503	A		9/2000	Daly
6,215,854	B1		4/2001	Walance
6,215,994	B1		4/2001	Schmidt et al.
6,292,668	B1		9/2001	Alanara et al.
6,321,098	B1	*	11/2001	Beith et al. 455/564
6,377,950	B1		4/2002	Peters et al.
6,456,709	B1		9/2002	Cox et al.
2002/0004382	A1		1/2002	Cox et al.

OTHER PUBLICATIONS

U.S. patent application Ser. No. 09/217,065, Hoyt A. Fleming, III, filed Dec. 21, 1998.
U.S. patent application Ser. No. 09/217,255, Hoyt A. Fleming, III, filed Dec. 21, 1998.
U.S. patent application Ser. No. 09/241,426, Hoyt A. Fleming, III et al., filed Feb. 2, 1999.

* cited by examiner

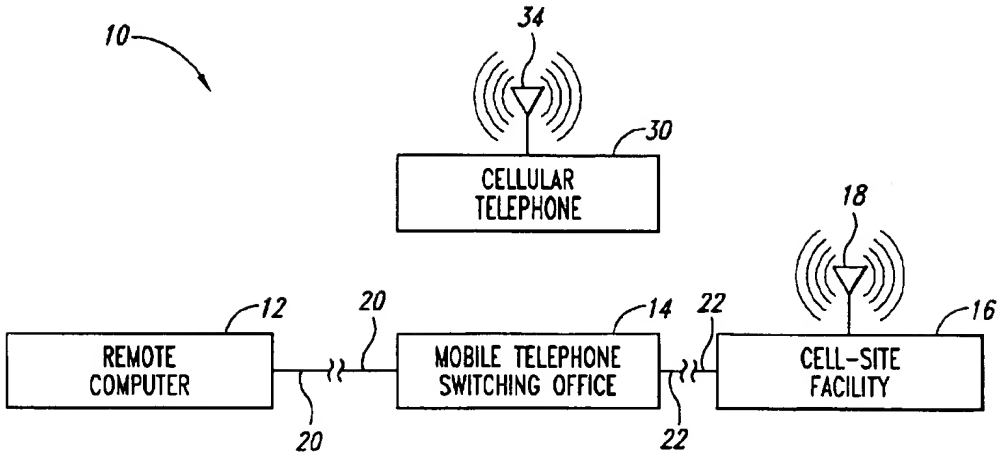

10
34
30
CELLULAR TELEPHONE
18
12
20
14
22
16
REMOTE COMPUTER
MOBILE TELEPHONE SWITCHING OFFICE
CELL-SITE FACILITY
20
22

Fig. 1

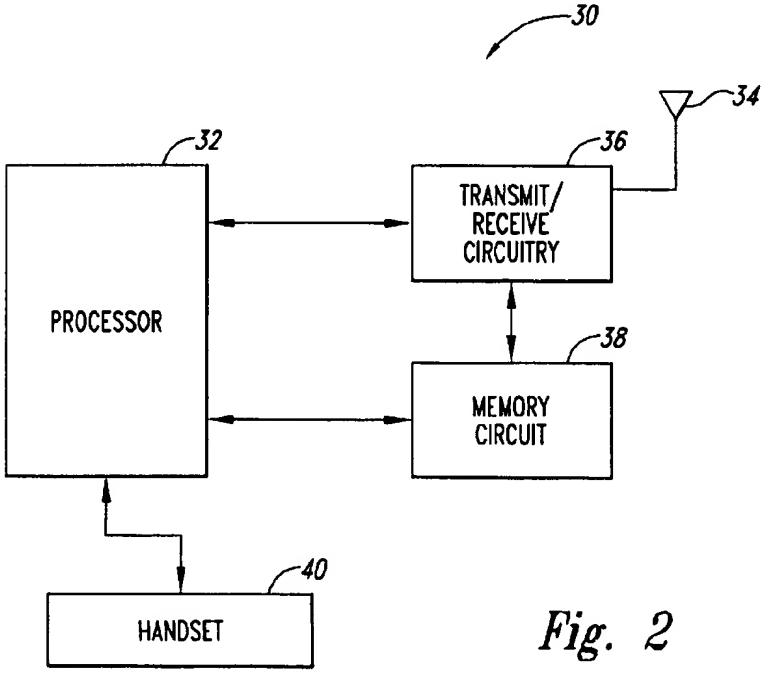

30
34
32
36
TRANSMIT/ RECEIVE CIRCUITRY
PROCESSOR
38
MEMORY CIRCUIT
40
HANDSET

Fig. 2

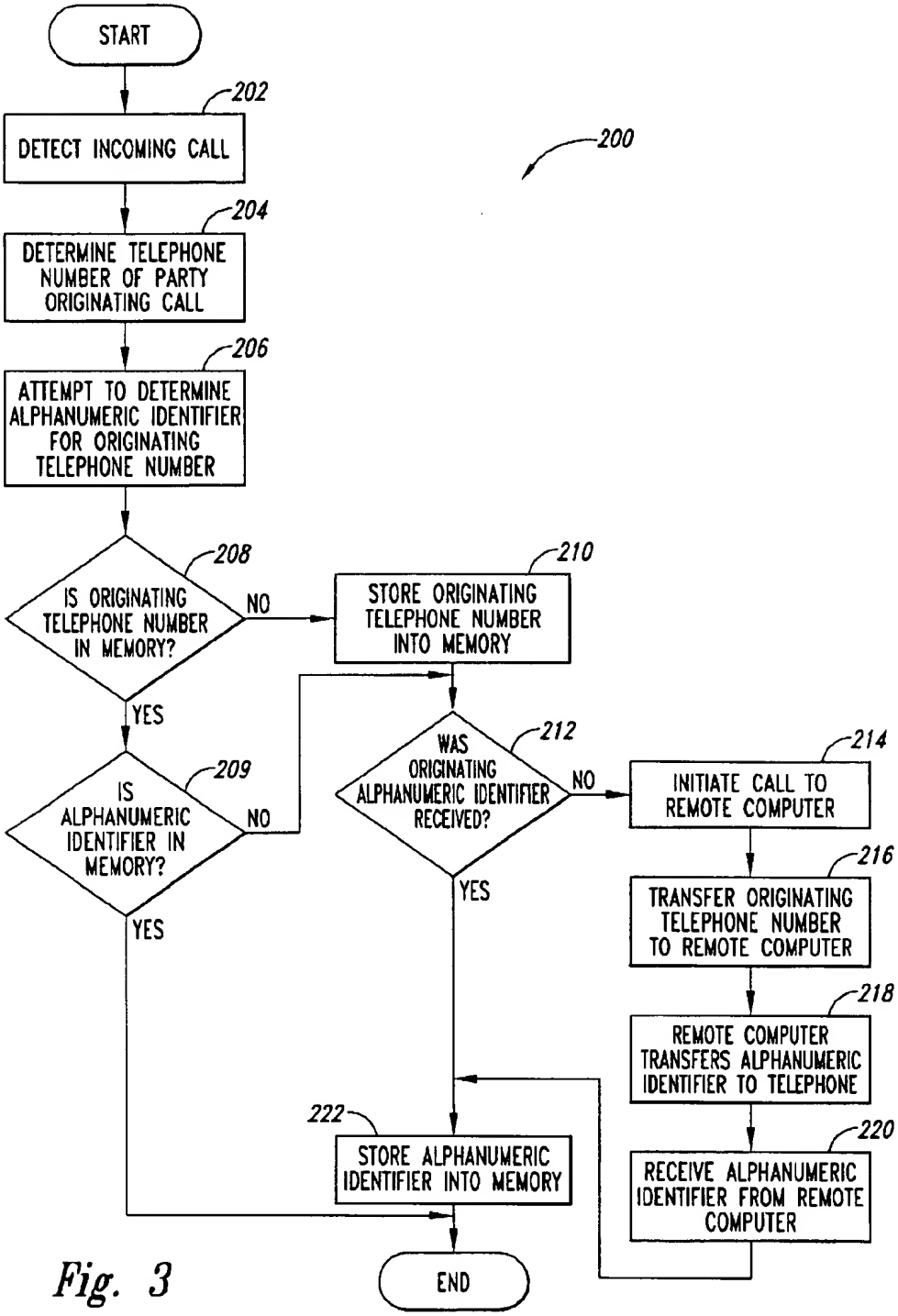

START
202
DETECT INCOMING CALL
200
204
DETERMINE TELEPHONE NUMBER OF PARTY ORIGINATING CALL
206
ATTEMPT TO DETERMINE ALPHANUMERIC IDENTIFIER FOR ORIGINATING TELEPHONE NUMBER
208
IS ORIGINATING TELEPHONE NUMBER IN MEMORY?
NO
210
STORE ORIGINATING TELEPHONE NUMBER INTO MEMORY
YES
209
IS ALPHANUMERIC IDENTIFIER IN MEMORY?
NO
212
WAS ORIGINATING ALPHANUMERIC IDENTIFIER RECEIVED?
NO
214
INITIATE CALL TO REMOTE COMPUTER
YES
216
TRANSFER ORIGINATING TELEPHONE NUMBER TO REMOTE COMPUTER
218
REMOTE COMPUTER TRANSFERS ALPHANUMERIC IDENTIFIER TO TELEPHONE
220
RECEIVE ALPHANUMERIC IDENTIFIER FROM REMOTE COMPUTER
222
STORE ALPHANUMERIC IDENTIFIER INTO MEMORY
YES
END

Fig. 3

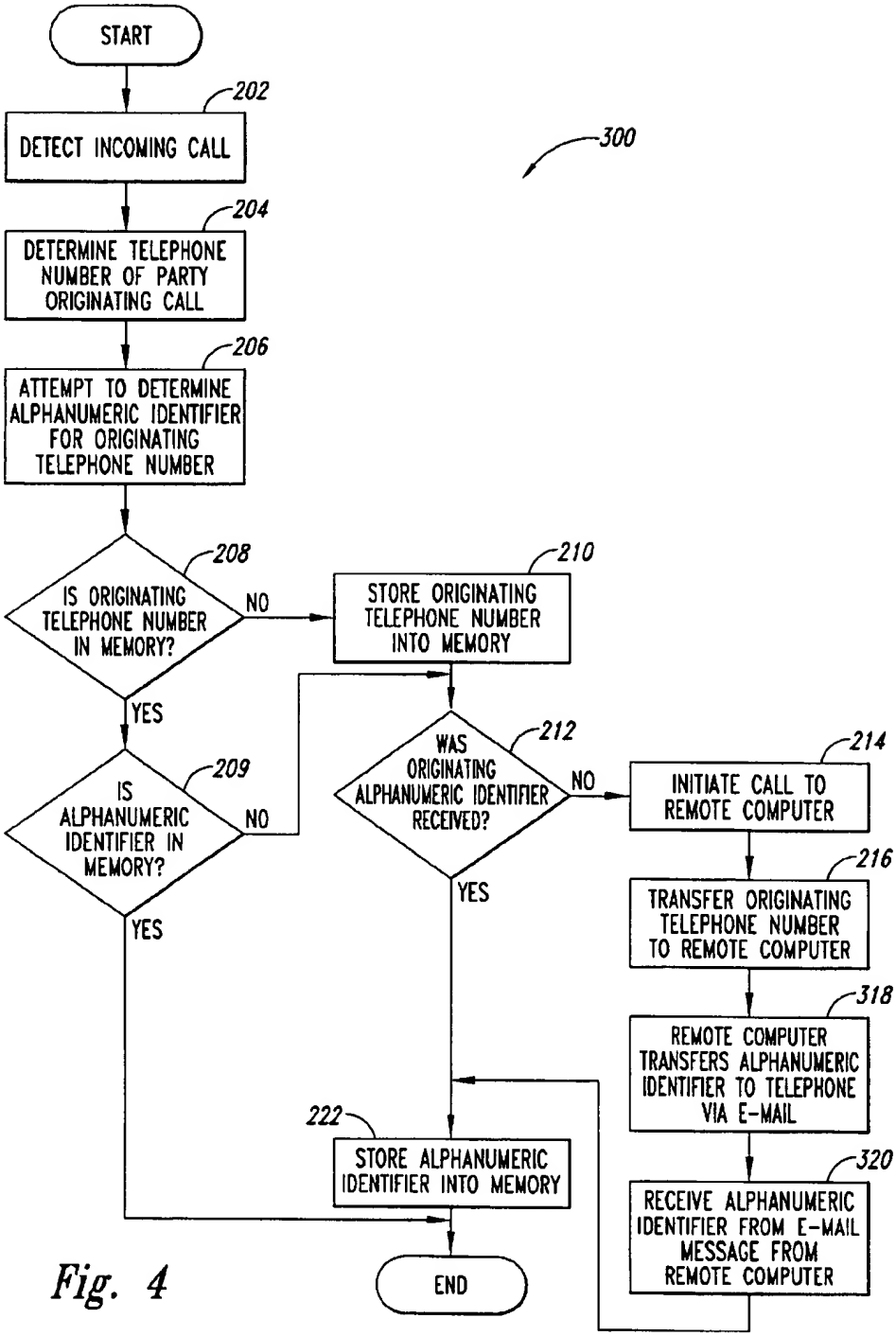

START
202
DETECT INCOMING CALL
300
204
DETERMINE TELEPHONE NUMBER OF PARTY ORIGINATING CALL
206
ATTEMPT TO DETERMINE ALPHANUMERIC IDENTIFIER FOR ORIGINATING TELEPHONE NUMBER
208
IS ORIGINATING TELEPHONE NUMBER IN MEMORY?
NO
210
STORE ORIGINATING TELEPHONE NUMBER INTO MEMORY
YES
209
IS ALPHANUMERIC IDENTIFIER IN MEMORY?
NO
212
WAS ORIGINATING ALPHANUMERIC IDENTIFIER RECEIVED?
NO
214
INITIATE CALL TO REMOTE COMPUTER
YES
216
TRANSFER ORIGINATING TELEPHONE NUMBER TO REMOTE COMPUTER
318
REMOTE COMPUTER TRANSFERS ALPHANUMERIC IDENTIFIER TO TELEPHONE VIA E-MAIL
320
RECEIVE ALPHANUMERIC IDENTIFIER FROM E-MAIL MESSAGE FROM REMOTE COMPUTER
YES
222
STORE ALPHANUMERIC IDENTIFIER INTO MEMORY
END

Fig. 4

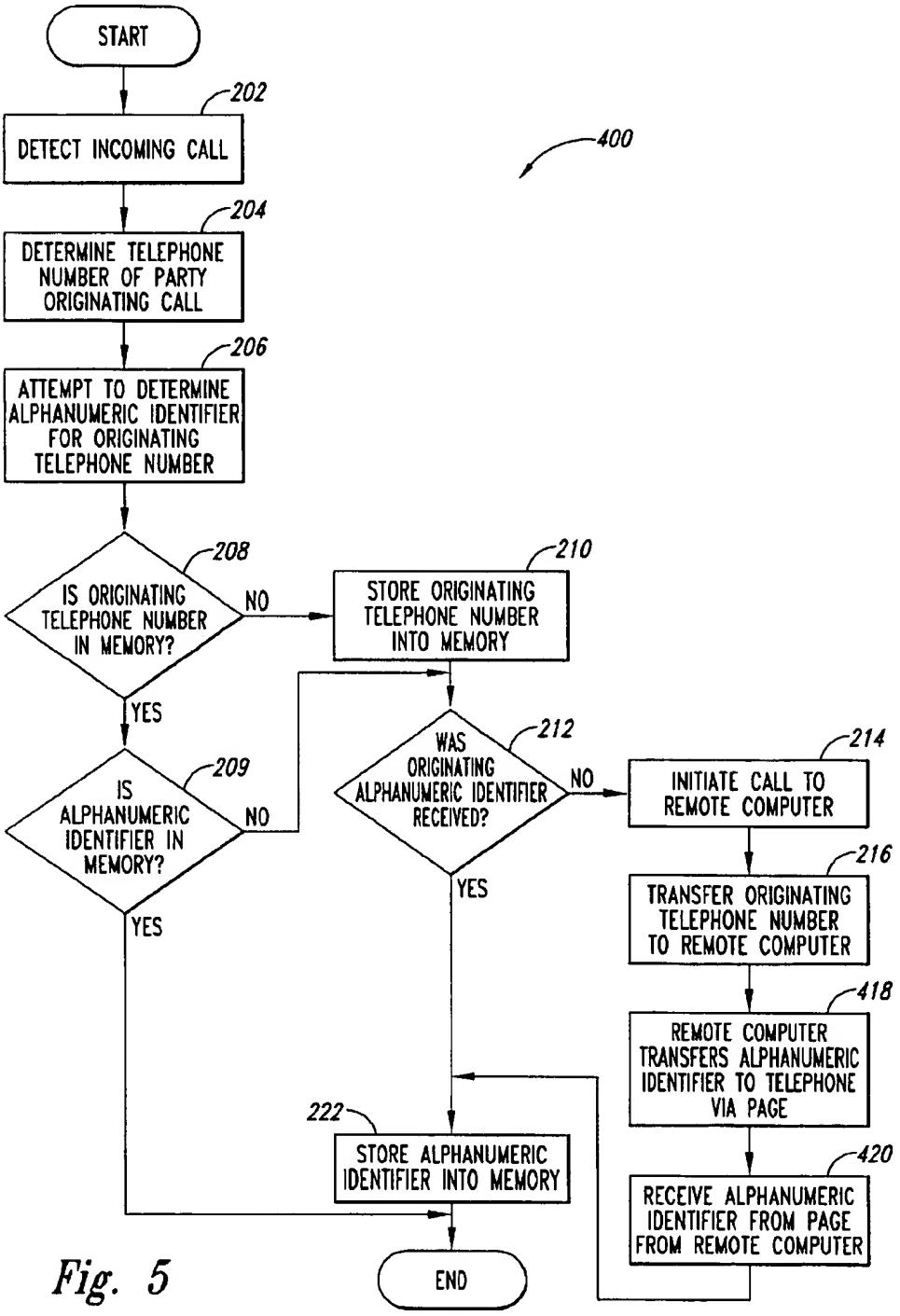

START
202
DETECT INCOMING CALL
400
204
DETERMINE TELEPHONE NUMBER OF PARTY ORIGINATING CALL
206
ATTEMPT TO DETERMINE ALPHANUMERIC IDENTIFIER FOR ORIGINATING TELEPHONE NUMBER
208
IS ORIGINATING TELEPHONE NUMBER IN MEMORY?
NO
210
STORE ORIGINATING TELEPHONE NUMBER INTO MEMORY
YES
209
IS ALPHANUMERIC IDENTIFIER IN MEMORY?
NO
212
WAS ORIGINATING ALPHANUMERIC IDENTIFIER RECEIVED?
NO
214
INITIATE CALL TO REMOTE COMPUTER
YES
216
TRANSFER ORIGINATING TELEPHONE NUMBER TO REMOTE COMPUTER
418
REMOTE COMPUTER TRANSFERS ALPHANUMERIC IDENTIFIER TO TELEPHONE VIA PAGE
420
RECEIVE ALPHANUMERIC IDENTIFIER FROM PAGE FROM REMOTE COMPUTER
YES
222
STORE ALPHANUMERIC IDENTIFIER INTO MEMORY
END

Fig. 5

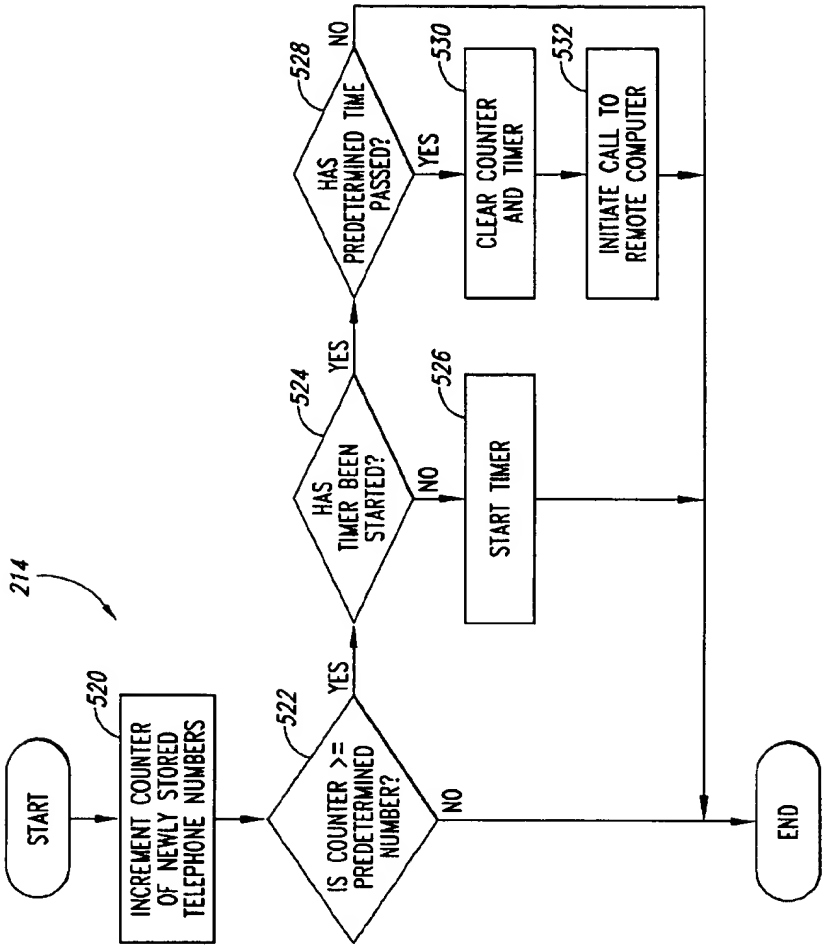

214
START
INCREMENT COUNTER OF NEWLY STORED TELEPHONE NUMBERS
520
IS COUNTER >= PREDETERMINED NUMBER?
522
YES
NO
HAS TIMER BEEN STARTED?
524
YES
NO
START TIMER
526
HAS PREDETERMINED TIME PASSED?
528
YES
NO
CLEAR COUNTER AND TIMER
530
INITIATE CALL TO REMOTE COMPUTER
532
END

Fig. 7

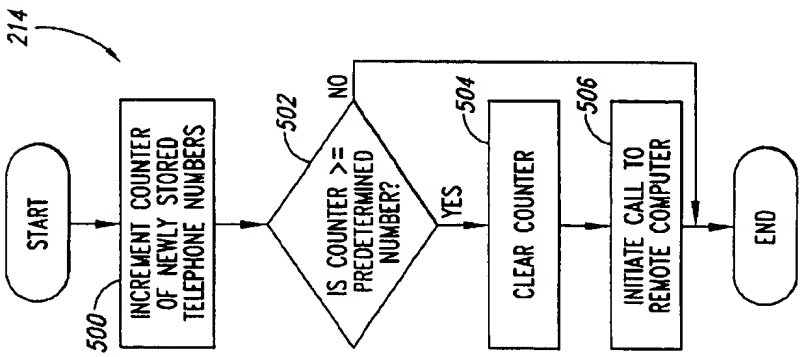

214
START
INCREMENT COUNTER OF NEWLY STORED TELEPHONE NUMBERS
500
IS COUNTER >= PREDETERMINED NUMBER?
502
YES
NO
CLEAR COUNTER
504
INITIATE CALL TO REMOTE COMPUTER
506
END

Fig. 6

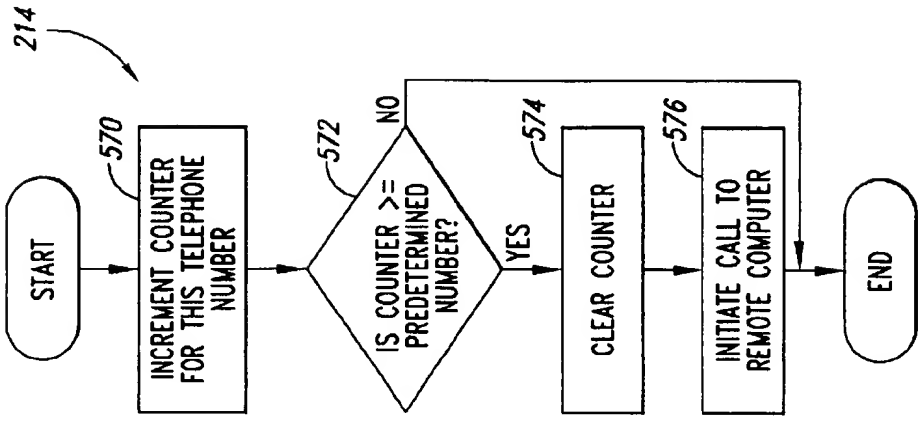

214
START
570
INCREMENT COUNTER FOR THIS TELEPHONE NUMBER
572
IS COUNTER >= PREDETERMINED NUMBER?
NO
YES
574
CLEAR COUNTER
576
INITIATE CALL TO REMOTE COMPUTER
END

Fig. 9

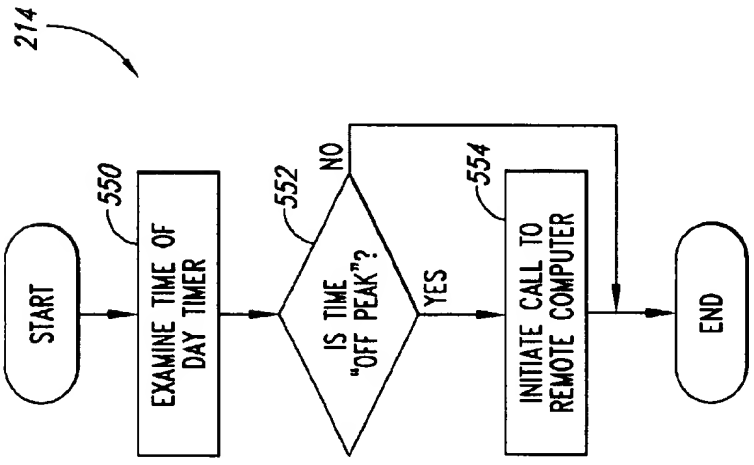

214
START
550
EXAMINE TIME OF DAY TIMER
552
IS TIME "OFF PEAK"?
NO
YES
554
INITIATE CALL TO REMOTE COMPUTER
END

Fig. 8

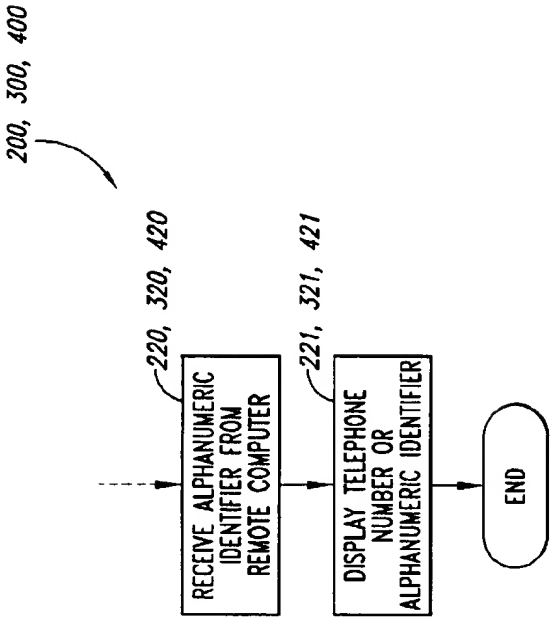

200, 300, 400
220, 320, 420
RECEIVE ALPHANUMERIC IDENTIFIER FROM REMOTE COMPUTER
221, 321, 421
DISPLAY TELEPHONE NUMBER OR ALPHANUMERIC IDENTIFIER
END

Fig. 11

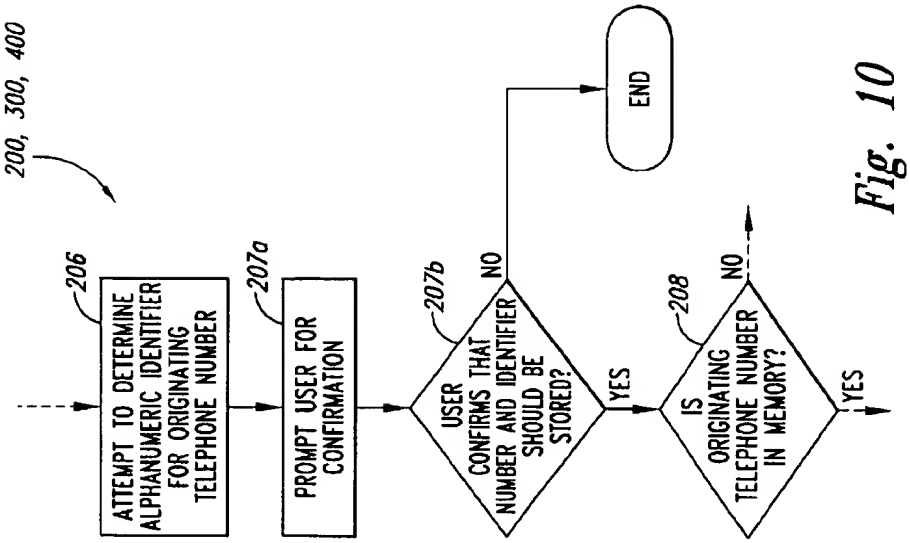

200, 300, 400
206
ATTEMPT TO DETERMINE ALPHANUMERIC IDENTIFIER FOR ORIGINATING TELEPHONE NUMBER
207a
PROMPT USER FOR CONFIRMATION
207b
USER CONFIRMS THAT NUMBER AND IDENTIFIER SHOULD BE STORED?
NO
YES
END
208
IS ORIGINATING TELEPHONE NUMBER IN MEMORY?
NO
YES

Fig. 10

METHOD OF PROGRAMMING TELEPHONE NUMBERS AND IDENTIFIERS IN A TELEPHONE

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to the field of telephones and, more particularly to a method of programming telephone numbers and telephone number identifiers into a telephone.

2. Description of the Related Art

In recent years, public use of wireless communication devices, such as wireless telephones, has increased greatly. Wireless telephones, such as cellular telephones, are typically either independently powered hand-held units or are mounted in vehicles.

Because of their mobility, wireless telephones must be light and compact. A user needs to be able to comfortably carry the telephone in a pocket, purse or briefcase. For example, it is common for a wireless telephone to have only a liquid crystal display (LCD), a numeric keypad, a very limited number of control buttons, such as a clear/end button, a send button and a power button. A personal digital assistant (PDA) incorporating a wireless telephone might include a touch sensitive or pen-based screen in addition to the above list of user-interface devices.

In recent years, wireless telephones have been manufactured with operating features identical to those found in conventional telephones. In addition, wireless telephones have been manufactured with paging and PDA features. Despite all of the technological advancements, wireless telephones are not without their shortcomings. For example, today's wireless telephones allow a user to program their frequently dialed telephone numbers into the memory of their telephone for later rapid dialing, but this programming function must be performed manually. Manual programming of the wireless telephone can take time and requires the user to remember how to perform the steps required to carry out the programming function.

The user can refer to the wireless telephone user manual to determine the steps required to properly program telephone numbers into the telephone. This, however, is not preferred since these manuals are rarely, if ever, carried around with the telephone. Without the manual the user will not be able to manually program telephone numbers into the wireless telephone. Even if the user locates the telephone manual, the user may still have difficulty in programming telephone numbers into the wireless telephone since some users may not understand the lengthy and detailed instructions. Accordingly, there is a need and desire for a method and apparatus for automatically programming telephone numbers into a wireless telephone.

Moreover, most wireless telephones also allow the user to associate and program an alphanumeric identifier for each telephone number stored in the telephone's memory. These alphanumeric identifiers may then be used to quickly recall and dial a stored telephone number without requiring a user to remember the called party's telephone number. Unfortunately, this programming function must also be performed manually and suffers from at least the same drawbacks associated with the programming of dialed phone numbers. Accordingly, there is a need and desire for a method and apparatus for automatically programming a telephone number's alphanumeric identifier into a wireless telephone.

SUMMARY OF THE INVENTION

The present invention provides a method and apparatus for automatically programming telephone numbers into a telephone.

The present invention also provides a method and apparatus for automatically programming a telephone number's alphanumeric identifier into a telephone.

The above and other features and advantages of the invention are achieved by a method and telephone apparatus that detects an incoming telephone call and determines if the telephone number of the call's originator has previously been stored in the memory of the telephone. If the originator's telephone number has not been previously stored, it is stored into the memory of the telephone. In addition, if an alphanumeric identifier associated with the originator's telephone number was received with the originator's telephone number, it is also stored into memory. If the alphanumeric identifier was not received, the telephone automatically initiates a call to a remote computer and transmits the telephone number of the originator to the remote computer. The computer assigns an alphanumeric identifier to the telephone number and transmits the alphanumeric identifier back to the telephone which stores the alphanumeric identifier in the telephone memory in association with the telephone number. Accordingly, the telephone number can later be recalled and dialed through the use of the alphanumeric identifiers.

BRIEF DESCRIPTION OF THE DRAWINGS

The foregoing and other advantages and features of the invention will become more apparent from the detailed description of the preferred embodiments of the invention given below with reference to the accompanying drawings in which:

FIG. **1** illustrates a block diagram of a wireless cellular telephone system which can be used to practice the present invention;

FIG. **2** illustrates an exemplary wireless cellular telephone used in the system of FIG. **1**;

FIG. **3** is a flow chart illustrating a first embodiment of an automatic telephone number and alphanumeric identifier programming process;

FIG. **4** is a flow chart illustrating a second embodiment of an automatic telephone number and alphanumeric identifier programming process;

FIG. **5** is a flow chart illustrating a third embodiment of an automatic telephone number and alphanumeric identifier programming process;

FIG. **6** is a flow chart illustrating a first alternative method of initiating a telephone call to a remote computer utilized by an embodiment of the present invention;

FIG. **7** is a flow chart illustrating a second alternative method of initiating a telephone call to a remote computer utilized by an embodiment of the present invention;

FIG. **8** is a flow chart illustrating a third alternative method of initiating a telephone call to a remote computer utilized by an embodiment of the present invention;

FIG. **9** is a flow chart illustrating a fourth alternative method of initiating a telephone call to a remote computer utilized by an embodiment of the present invention;

FIG. **10** is a flow chart illustrating a modification of the automatic telephone number and alphanumeric identifier programming processes of FIGS. **3–5**; and

FIG. **11** is a flow chart illustrating an additional modification of the automatic telephone number and alphanumeric identifier programming processes of FIGS. **3–5**.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

Oftentimes the originator of an incoming telephone call to a cellular telephone is a person or entity which the user of the cellular telephone also calls. The user would want to program the telephone numbers, and associated alphanumeric identifiers, of the originators of incoming calls so that the originators may be called back quickly and without the user remembering the telephone numbers of the originators. Accordingly, the present invention detects incoming telephone calls to a cellular telephone and automatically stores the telephone numbers, and their alphanumeric identifiers, of the originators of the calls into the memory of the user's cellular telephone. In addition, if an alphanumeric identifier of the originator of a call is not received with the incoming telephone number it can be retrieved and stored in association with the telephone number.

Although the invention is described below in the context of a cellular wireless telephone, the invention is not so limited and may be used with any type of telephone or other communication device where a series of numbers and/or symbols must be entered to establish a connection to a called party. Accordingly, the below detailed description of use of the invention with a cellular telephone is only representative and not limiting of the invention. Other embodiments may be utilized and structural, logical, or programming changes may be made without departing from the spirit or scope of the present invention.

FIG. **1** illustrates a block diagram of a cellular telephone system **10** which can be used to practice the present invention. The system **10** includes a remote computer **12** connected by a telephone line **20** to a Mobile Telephone Switching Office (MTSO) **14**. The MTSO **14** is connected by a telephone line **22** to cellular telephone facility **16** (also referred to herein as a "cell-site facility **16**"). The cell-site facility **16** includes an antenna **18** for transmitting voice and digital information via various voice and digital channels to an antenna **34** of a cellular telephone **30**. The antenna **18** of the cell-site facility **16** is also used to receive voice and digital information via the various voice and digital channels from the antenna **34** of the cellular telephone **30**. The system **10** could include more cell-site facilities **16** and cellular telephones **30** if so desired, but only one of facility **16** and telephone **30** are illustrated for convenience purposes.

As will be discussed below with reference to FIGS. **3–9**, the present invention will utilize the remote computer **12** to retrieve alphanumeric identifiers associated with telephone numbers to be programmed into the telephone **30**. Preferably, the remote computer **12** is a general purpose computer, such as the Micron CLIENTPRO™. The remote computer **12** will contain a modem so that it may be connected to the MTSO **14** by a plain old telephone system (POTS) telephone line **20**.

The remote computer **12** will contain a database of at least telephone numbers and alphanumeric identifiers which have been assigned to each telephone number. The database residing in the remote computer **12** may also contain other information associated with each telephone number in the database. Additional information may include street address, city, state and any other information desired by the users of the cellular telephone **30**. The remote computer **12** may be operated by a telephone company, cellular service provider, a company that manufactures and/or distributes cellular telephones, or even may be maintained and operated by a cellular telephone user.

As will be discussed below, the remote computer **12** is programmed to receive telephone calls via the modem, receive a telephone number from a telephone, perform a database search based on the received telephone number to determine if an alphanumeric identifier has been previously assigned to the received telephone number and if not, to assign one and to output back to the telephone the alphanumeric identifier (and other information if necessary) assigned to the telephone number. The remote computer **12** may communicate back to the telephone **30** directly over the telephone line **20**, via e-mail, or even by paging the telephone **30** (if the telephone **30** has mail or paging capabilities).

The invention is implemented on the telephone side by the provision of some additional programming of the telephone processor, such as a cellular telephone processor, to enable the telephone to carry out the operations described herein. The invention may be implemented in any conventional cellular telephone which includes a processor to control the complex functions of the cellular telephone. Thus, the invention is not restricted to any particular cellular telephone circuit architecture.

U.S. Pat. No. 5,109,403 to Sutphin shows one representative telephone circuit and associated processor which can be programmed to implement the invention and the disclosure of this patent is incorporated herein by reference. The '403 patent includes a microcomputer processor called a controller which interacts with various other circuits to enable the telephone to perform its cellular telephone operations. This controller is further programmed as described below to implement the invention. FIG. **2** illustrates in a high level block diagram a cellular telephone **30** having a processor serving as a controller **32**, transmit/receive circuitry **36**, memory circuit **38**, antenna **34** and a handset **40** representative of the telephone disclosed in the '403 patent.

FIG. **3** is a flow chart illustrating an exemplary automatic telephone number and alphanumeric identifier process **200** performed by the processor **32** of FIG. **2** in order to carry out an embodiment of the invention. Initially, the process **200** detects an incoming telephone call on the user's telephone (step **202**). At step **204**, the telephone number of the originator of the incoming telephone call (hereinafter referred to as the "originating telephone number") is retrieved from the incoming telephone message. As is known in the art, the originating telephone number may be determined from the Caller ID protocol of the incoming telephone message. Once the originating telephone number has been determined, an attempt is made to determine the alphanumeric identifier of the originating telephone number (step **206**). This may also be retrieved from the Caller ID protocol of the incoming message. Oftentimes, however, an alphanumeric identifier is not contained as part of the incoming message. Accordingly, after step **206**, the process **200** will have the originating telephone number, but may not have the alphanumeric identifier associated with that telephone number.

At this point, it is determined if the originating telephone number is currently programmed in to the memory of the telephone (step **208**). If the originating telephone number is stored into the memory of the telephone, step **209**, determining if an alphanumeric identifier has been stored with the telephone number, is performed. If an alphanumeric identifier is not found, the process **200** continues at step **212** (described below) to determine if an identifier was transmitted with the incoming message. If an alphanumeric identifier is found the process **200** is complete.

If the originating telephone number is not stored into the memory of the telephone (step **208**), the process continues at step **210** where the originating telephone number is stored

into the memory of the user's telephone. The originating telephone number may be stored in a temporary memory or it may be stored in a non-volatile memory of the telephone. Using non-volatile RAM allows the process **200** to retain the originating telephone number even if the user powers down the telephone.

Once the telephone number is stored into memory, it is determined whether an alphanumeric identifier was received from the incoming message (step **212**). If an alphanumeric identifier was received, the process **200** continues at step **222** where the alphanumeric identifier is stored into the memory of the telephone. If an alphanumeric identifier was not received, the process **200** continues after step **212** to step **214** where a telephone call is initiated to the remote computer **12** illustrated in FIG. **1**. This step **214** may be performed immediately after the user completes the incoming telephone call.

To initiate the call to the remote computer, the telephone number of the remote computer is pre-stored into the memory of the user's telephone. It is desirable, and in some instances it is preferable, to have the telephone number of the remote computer stored in the memory containing the software controlling the operation of the telephone. The number can be supplied by the service provider or entity responsible for maintaining the remote computer and can be programmed into the memory when the service is initiated or at any point thereafter.

As is known in the art, when the call to the remote computer is initiated, a MTSO assigns an available voice channel to the user's cellular telephone. The telephone then tunes to the frequency of the assigned channel. The MTSO couples the cell-site proximate to the user's telephone to the phone line of the remote computer. The remote computer answers the call. At this point, a voice channel is established between the remote computer and the user's telephone (via the cell-site and MTSO). At this point, conventional login/handshaking between the modems of the telephone and remote computer occur. An example of a login/handshaking is also found in the '403 patent to Sutphin. Once the login/handshaking is completed, digital data may be transmitted between the remote computer and the telephone.

The telephone transfers the originating telephone number to the remote computer over the established channel by methods known in the art (step **216**). The remote computer determines the telephone number of the calling cellular telephone using caller ID techniques and then receives the originating telephone number and assigns an alphanumeric identifier to it. As stated above, depending on the capabilities of the telephone, the remote computer may also retrieve addressing or other pertinent information associated with the originating telephone number from a database. Once retrieved, the remote computer transfers the alphanumeric identifier (and other stored database information) to the telephone over the established channel (step **218**).

The alphanumeric and other information is received by the telephone over the voice channel (step **220**) and the information is stored into the memory of the telephone (step **222**). The telephone number and associated alphanumeric identifier will be stored in a non-volatile memory to preserve the information. If temporary memory is used throughout the process **200**, then the information must be transferred to the non-volatile memory before the telephone is powered down.

Once the originating telephone number and its alphanumeric identifier are programmed into the memory of the telephone, the user may use the identifier to initiate telephone calls without dialing or even remembering the telephone number. The user may also retrieve the other associated information to perform PDA functions as well.

FIG. **4** is a flow chart illustrating a second embodiment of an automatic telephone number and alphanumeric identifier programming process **300**. The process **300** may be implemented when the telephone has an e-mail capability. The process **300** is essentially the same as the process **200** (FIG. **3**) except that the remote computer transfers the alphanumeric identifier and other information associated with the originating telephone number via a subsequent short message service (SMS) e-mail to the user's telephone (step **318**). The telephone receives the e-mail and parses out the alphanumeric identifier (and other information) from the e-mail message (step **320**). The information parsed out of the e-mail message is then stored into the memory of the telephone (step **222**). The alphanumeric identifier is stored in association with the telephone number it now identifies. It must be noted that e-mail or page can be used to transfer the dialed telephone number to the remote computer.

FIG. **5** is a flow chart illustrating a third embodiment of an automatic telephone number and alphanumeric identifier programming process **400**. The process **400** may be implemented when the telephone has a paging capability. The process **400** is essentially the same as the process **200** (FIG. **3**) except that the remote computer transfers the alphanumeric identifier and other information associated with the originating telephone number via a subsequent page to the user's telephone (step **418**). The telephone receives the page and parses out the alphanumeric identifier (and other information) from the page (step **420**). The information parsed out of the page is then stored into the memory of the telephone (step **222**). Again, the alphanumeric identifier is stored in association with the telephone number it now identifies.

The present invention can be modified in several ways. Referring to FIG. **10**, for example, steps **207A** and **207B** can be inserted between steps **206** and **208** of any of the embodiments of the present invention to require the user for a keyboard entry in order to store the originating number. That is, step **207A** would prompt the user for a confirmation that the originating telephone number and its retrieved associated alphanumeric identifier should be stored in the memory of the telephone. At step **207B**, if the user confirms that the number and information should be stored, the remaining steps of the process **200**, **300** or **400** will be performed. If the user does not confirm that the number and associated information should be stored, the remaining steps of the process **200**, **300** or **400** will not be performed.

In addition, the stored telephone number or its alphanumeric identifier can be displayed on the telephone's display if so desired. Referring now to FIG. **11**, this can be done as step **221** of process **200** (FIG. **3**) inserted after step **220**, step **321** of process **300** (FIG. **4**) inserted after step **320** or step **421** of process **400** (FIG. **5**) inserted after step **420**. In addition, due to the relatively low bandwidth required to transmit data between the remote computer and the telephone, tones of variable or constant durations can be used to transmit the information between the telephone and computer in any of the aforementioned embodiments.

FIG. **6** illustrates a first alternative method of initiating a telephone call to the remote computer (step **214** of FIGS. **3–5**). At step **500**, a counter corresponding to a number of stored telephone numbers which need an associated identifier is incremented for a newly stored originating telephone number. At step **502**, it is determined if the counter has

reached a predetermined number of stored telephone numbers. If the predetermined number has not been reached, a call will not be initiated to the remote computer and the processing of step **214** is complete causing the processing of FIGS. **3–5** to end. If the predetermined number has been reached, the counter is reset (step **504**) and a call is initiated to the remote computer (step **506**). At this point, the processing of step **214** is complete. Once the call to the remote computer is initiated, the present invention would repeat steps **216** to **220** (process **200**), steps **216** to **320** (process **300**) or steps **216** to **420** (process **400**) to properly retrieve and store alphanumeric identifiers (and other information) for all of the newly stored telephone numbers.

FIG. **7** illustrates a second alternative method of initiating a telephone call to the remote computer (step **214**). At step **520**, a counter corresponding to a number of newly stored telephone numbers is incremented for each newly stored originating telephone number. At step **522**, it is determined if the counter has reached a predetermined number of stored telephone numbers. If the predetermined number has not been reached, a call will not be initiated to the remote computer and the processing of step **214** is complete.

If the predetermined number has been reached, a determination is made as to whether a timer has been started (step **524**). If the timer has not been started, a timer is started (step **526**) and the processing of step **214** is complete. At this point a flag could be set to alert the telephone's controller to perform steps **524** to **532** at a later time if so desired. Otherwise, these steps will be performed the next time step **214** is performed (i.e., the next time the telephone number is stored).

If the timer has been started, a determination of whether the predetermined period of time has passed is made (step **528**). If the predetermined time has not passed, the processing of step **214** is complete. At this point a flag could be set to alert the telephone's controller to perform steps **524** to **532** at a later time if so desired. Otherwise, these steps will be performed the next time step **214** is performed (i.e., the next time a telephone number is stored). If the predetermined time has passed, the counter and timer are reset (step **530**) and a call is initiated to the remote computer (step **532**). At this point, the processing of step **214** is complete. Once the call to the remote computer is initiated, the present invention would repeat steps **216** to **220** (process **200**), steps **216** to **320** (process **300**), or steps **216** to **420** (process **400**) to properly retrieve and store alphanumeric identifiers (and other information) for all of the newly stored telephone numbers.

FIG. **8** illustrates a third alternative method of initiating a telephone call to the remote computer (step **214**). At step **550**, the time of day timer is examined. At step **552**, it is determined if the time of day corresponds to an "off peak" time of day. An off peak time of day is a time when the user of the telephone is charged with a discounted or lower rate by the cellular service provider. An off peak telephone call to the remote computer would save the user money. If the time is an off peak time, a telephone call is initiated to the remote computer (step **554**) and the processing of step **214** is complete. If the time is not an off peak time, a telephone call is not initiated and the processing of step **214** is complete. At this point a flag could be set to alert the telephone's controller to perform steps **550** to **554** at a later time if so desired. Otherwise, these steps will be performed the next time step **214** is performed (i.e., the next time a telephone number is stored).

FIG. **9** illustrates a fourth alternative method of initiating a telephone call to the remote computer (step **214**). At step **570**, a counter corresponding to a number of times that an originating telephone number has been stored is incremented for the detected originating telephone number. At step **572**, it is determined if the counter has reached a predetermined number of detections for the originating telephone number. If the predetermined number has not been reached, a call will not be initiated to the remote computer and the processing of step **214** is complete. If the predetermined number has been reached, the counter is reset (step **574**) and a call is initiated to the remote computer (step **576**). At this point, the processing of step **214** is complete. This prevents the present invention from storing telephone numbers that are called infrequently.

The present invention is implemented in software and the software instructions and data can be stored in PROM, EEPROM or other non-volatile memory of the telephone. The present invention can also be stored on a hard drive, floppy disc, CD-ROM or other permanent or semi-permanent storage medium and subsequently transferred to the memory of the telephone. The program embodying the present invention can also be divided into program code segments, downloaded, for example, from a server computer or transmitted as a data signal embodied in a carrier wave to the telephone as is known in the art. In addition, the present invention can be implemented in hardware or a combination of hardware and software.

While the invention has been described in detail in connection with the preferred embodiments known at the time, it should be readily understood that the invention is not limited to such disclosed embodiments. Rather, the invention can be modified to incorporate any number of variations, alterations, substitutions or equivalent arrangements not heretofore described, but which are commensurate with the spirit and scope of the invention. Accordingly, the invention is not to be seen as limited by the foregoing description, but is only limited by the scope of the appended claims.

What is claimed as new and desired to be protected by Letters Patent of the United States is:

1. A method of programming a telephone number and information associated with the telephone number into a telephone comprising:

detecting an incoming telephone call at the telephone;

determining the telephone number of the originator of the call;

determining if the originating telephone number is already stored into a memory of the telephone;

determining if information associated with the originating telephone number was received with the detected originating telephone number;

if the originating telephone number is not in the memory of the telephone, storing the originating telephone number into the memory of the telephone; and

if the information associated with the originating telephone number was not received, initiating a telephone call from the telephone to a computer, transferring the originating telephone number from the telephone to the computer, receiving information associated with the originating telephone number from the computer, and storing the information into the memory of the telephone.

2. The method of claim **1** further comprising the act of prompting a user to confirm whether the originating telephone number should be stored into the memory of the telephone and storing the originating telephone number into the memory only if the user confirms that the originating telephone number should be stored.

3. The method of claim 1 further comprising storing the information into the memory of the telephone if the information associated with the originating telephone number was received.

4. The method of claim 1 wherein the information is displayed on the telephone after it is received.

5. The method of claim 1 wherein the act of initiating a telephone call to the computer is performed after a user has completed the incoming telephone call.

6. The method of 1 wherein the act of initiating a telephone call to the computer is performed after a predetermined number of originating telephone numbers has been stored into the memory of the telephone and after a user has completed the incoming telephone call.

7. The method of claim 6 wherein the act of initiating a telephone call to the computer is performed after a predetermined time period has elapsed from the time the predetermined number of originating telephone numbers was stored into the memory of the telephone.

8. The method of claim 1 wherein the act of initiating a telephone call to the computer is performed only during off peak time intervals after a user has completed the incoming telephone call.

9. The method of claim 1 wherein the act of initiating a telephone call to the computer is performed after an originating telephone number has been detected a predetermined number times after a user has completed the incoming telephone call.

10. The method of claim 1 wherein the computer transfers the information associated with the originating telephone number to the telephone by an electronic mail message and the act of receiving the information is performed by receiving the electronic mail message.

11. The method of claim 1 wherein the computer transfers the information associated with the originating telephone number to the telephone by paging the telephone and the act of receiving the information is performed by receiving the page.

12. The method of claim 1 wherein the information associated with the originating telephone number comprises an alphanumeric identifier which can be used by a user to retrieve and dial the associated telephone number.

13. The method of claim 1 wherein the information associated with the originating telephone number comprises an alphanumeric identifier and an address associated with the originating telephone number.

14. A telephone comprising:

a memory circuit; and

a programmed processor, said programmed processor is programmed to:

detect an incoming telephone call at said telephone;

determine the telephone number of the originator of the call;

determine if the originating telephone number is already stored into said memory;

determine if information associated with the originating telephone number was received with the detected originating telephone number;

if the originating telephone number is not in said memory, store the originating telephone number into said memory; and

if information associated with the originating telephone number was not received, initiate a telephone call from the telephone to a computer, transfer the originating telephone number from the telephone to the computer, receive information associated with the originating telephone number from the computer, and store the information into said memory.

15. The telephone of claim 14 wherein said processor is programmed to prompt a user to confirm whether the originating telephone number should be stored into said memory and to store the originating telephone number only if the user confirms that the telephone number should be stored.

16. The telephone of claim 14 wherein said processor is further programmed to store the information identifier into said memory if the information associated with the originating telephone number was received.

17. The telephone of claim 14 further comprising a display and wherein the information associated with the originating telephone number is displayed on said display after it is received.

18. The telephone of claim 14 wherein said processor is programmed to initiate a telephone call to the computer after a user has completed the incoming telephone call.

19. The telephone of claim 14 wherein said processor is programmed to initiate a telephone call to the computer after a predetermined number of originating telephone numbers has been stored into said memory and after a user has completed the incoming telephone call.

20. The telephone of claim 19 wherein said processor is programmed to initiate a telephone call to the computer after a predetermined time period has elapsed from the time the predetermined number of originating telephone numbers was stored into said memory.

21. The telephone of claim 14 wherein said processor is programmed to initiate a telephone call to the computer only during off peak time intervals and after a user has completed the incoming telephone call.

22. The telephone of claim 14 wherein said processor is programmed to initiate a telephone call to the computer after an originating telephone number has been detected a predetermined number times and after a user has completed the incoming telephone call.

23. The telephone of claim 14 wherein the computer transfers the information associated with the originating telephone number to said telephone by an electronic mail message and said processor is programmed to receive said information from the electronic mail message.

24. The telephone of claim 14 wherein the computer transfers the information associated with the originating telephone number to said telephone by paging said telephone and said processor is programmed to receive the information from the page.

25. The telephone of claim 14 wherein the information associated with the originating telephone number comprises an alphanumeric identifier which can be used by a user to retrieve and dial the associated telephone number.

26. The telephone of claim 14 wherein the information associated with the originating telephone number comprises an alphanumeric identifier and an address associated with the originating telephone number.

27. A telephone system comprising:

a computer having a database comprising telephone numbers and information respectively associated with the telephone numbers; and

a telephone comprising:

a memory circuit; and

a programmed processor, said programmed processor is programmed to:

detect an incoming telephone call at said telephone;

determine the telephone number of the originator of the call;

determine if the originating telephone number is already stored into said memory;

determine if information associated with the originating telephone number was received with the detected originating telephone number;

if the originating telephone number is not in said memory, store the originating telephone number into said memory; and

if the information associated with the originating telephone number was not received, initiate a

telephone call from the telephone to said computer, transfer the originating telephone number from the telephone to said computer, receive the information associated with the originating telephone number from said computer, and store the information into said memory.

28. The system of claim 27 wherein said processor is programmed to prompt a user to confirm whether the originating telephone number should be stored into said memory and stores the originating telephone number only if the user confirms that the number should be stored.

29. The system of claim 27 wherein said processor is further programmed to store the information into said memory if the information associated with the originating telephone number was received.

30. The system of claim 27 wherein the telephone further comprises a display and wherein the information associated with the originating telephone number is displayed on said display after it is received.

31. The system of claim 27 wherein said processor is programmed to initiate a telephone call to said computer after a user has completed the incoming telephone call.

32. The system of claim 27 wherein said processor is programmed to initiate a telephone call to said computer after a predetermined number of originating telephone numbers has been stored into said memory and a user completes the incoming telephone call.

33. The system of claim 32 wherein said processor is programmed to initiate a telephone call to said computer after a predetermined time period has elapsed from the time the predetermined number of originating telephone numbers was stored into said memory.

34. The system of claim 27 wherein said processor is programmed to initiate a telephone call to said computer only during off peak time intervals and after a user has completed the incoming telephone call.

35. The system of claim 27 wherein said processor is programmed to initiate a telephone call to said computer after an originating telephone number has been detected a predetermined number times and after a user completes the incoming telephone call.

36. The system of claim 27 wherein said computer transfers the information associated with the originating telephone number to said telephone by an electronic mail message and said processor is programmed to receive the information from the electronic mail message.

37. The system of claim 27 wherein said computer transfers the information associated with the originating telephone number to said telephone by paging said telephone and said processor is programmed to receive the information from the page.

38. The system of claim 27 wherein the information associated with the originating telephone number comprises an alphanumeric identifier which can be used by a user to retrieve and dial the associated telephone number.

39. The system of claim 27 wherein the information associated with the originating telephone number comprises an alphanumeric identifier and an address associated with the originating telephone number.

40. A telephone system comprising:

a computer having a database comprising telephone numbers and information respectively associated with the telephone numbers; and

a telephone comprising:

a memory circuit; and

a controller coupled to said memory circuit, said controller:

detecting an incoming telephone call at said telephone;

determining the telephone number of the originator of the call;

determining if the originating telephone number is already stored into said memory;

determining if information associated with the originating telephone number was received with the detected originating telephone number;

if the originating telephone number is not in said memory, storing the originating telephone number into said memory; and

if the information associated with the originating telephone number was not received, initiates a telephone call from the telephone to said computer, transfers the originating telephone number from the telephone to said computer, receives the information associated with the originating telephone number from said computer, and stores the information into said memory.

41. The system of claim 40 wherein said controller prompts a user to confirm whether the originating telephone number should be stored into said memory and stores the originating telephone number only if the user confirms that the number should be stored.

42. The system of claim 40 wherein said controller further stores the information into said memory if the information associated with the originating telephone number was received.

43. The system of claim 40 wherein the telephone further comprises a display and wherein the information associated with the originating telephone number is displayed on said display after it is received.

44. The system of claim 40 wherein said controller initiates a telephone call to said computer after a user has completed the incoming telephone call.

45. The system of claim 40 wherein said controller initiates a telephone call to said computer after a predetermined number of originating telephone numbers has been stored into said memory and a user completes the incoming telephone call.

46. The system of claim 45 wherein said controller initiates a telephone call to said computer after a predetermined time period has elapsed from the time the predetermined number of originating telephone numbers was stored into said memory.

47. The system of claim 40 wherein said controller initiates a telephone call to said computer only during off peak time intervals and after a user has completed the incoming telephone call.

48. The system of claim 40 wherein said controller initiates a telephone call to said computer after an originating telephone number has been detected a predetermined number times and after a user completes the incoming telephone call.

49. The system of claim 40 wherein said computer transfers the information associated with the originating telephone number to said telephone by an electronic mail message and said controller receives the information from the electronic mail message.

50. The system of claim 40 wherein said computer transfers the information associated with the originating telephone number to said telephone by paging said telephone and said controller receives the information from the page.

51. The system of claim 40 wherein the information associated with the originating telephone number comprises an alphanumeric identifier which can be used by a user to retrieve and dial the associated telephone number.

52. The system of claim 40 wherein the information associated with the originating telephone number comprises an alphanumeric identifier and an address associated with the originating telephone number.

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(54) INFRARED TRANSMISSION SYSTEM WITH AUTOMATIC CHARACTER IDENTIFICATION

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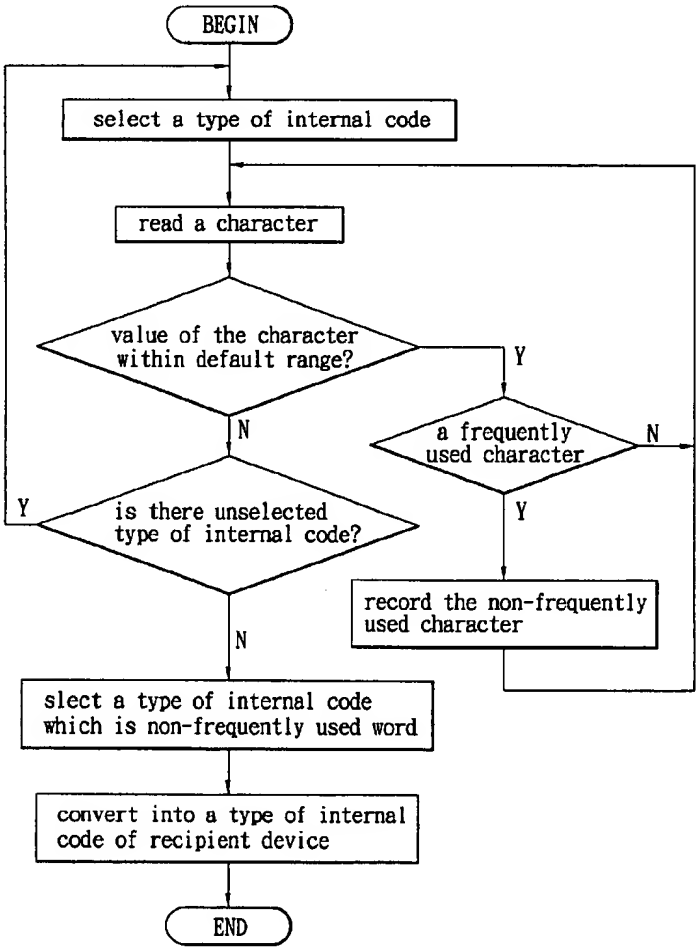
(57) ABSTRACT

An infrared transmission system with automatic character identification is disclosed. In the process of identifying a selected type of internal code contained in information sent from a sender device, check whether the value of each character contained in the sent information is within a default range of a specific internal code, discard all internal codes having values other than the default range, perform an conversion and an analysis on the qualified information based on the value of internal code thereof, select those less frequently appeared and qualified types of internal codes as the types of internal codes, and convert the received information into one having the type of internal code compatible to the recipient device. This can prevent random codes from occurring, show the correct information at the recipient device, carry out an errorless information communication and exchange between various electronic devices supporting software of different languages.



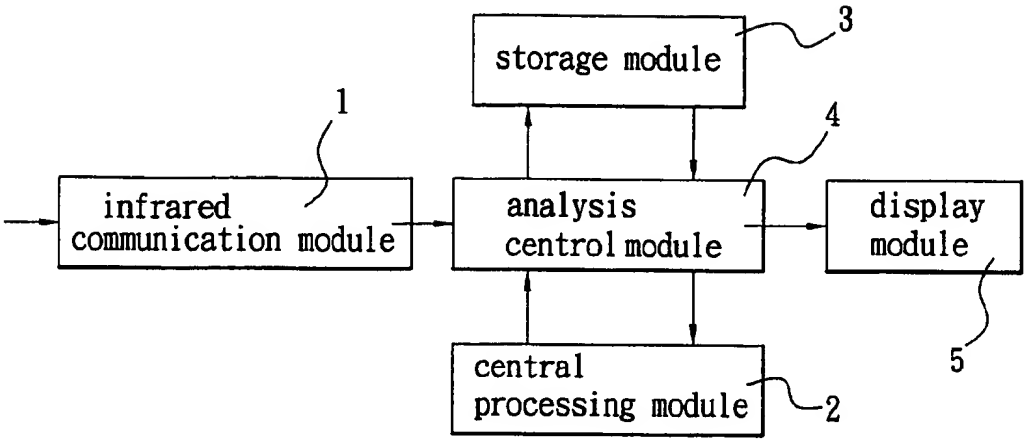

storage module
3
1
4
infrared communication module
analysis centrol module
display module
5
central processing module
2

FIG. 1

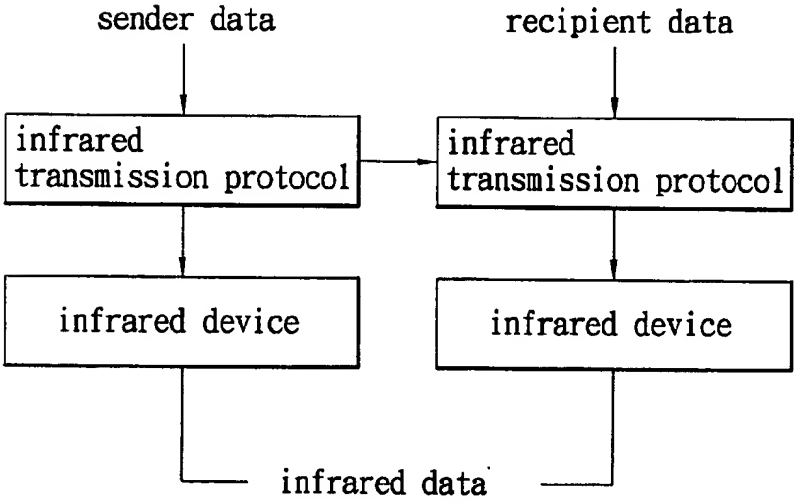

sender data
recipient data
infrared transmission protocol
infrared transmission protocol
infrared device
infrared device
infrared data

FIG. 2

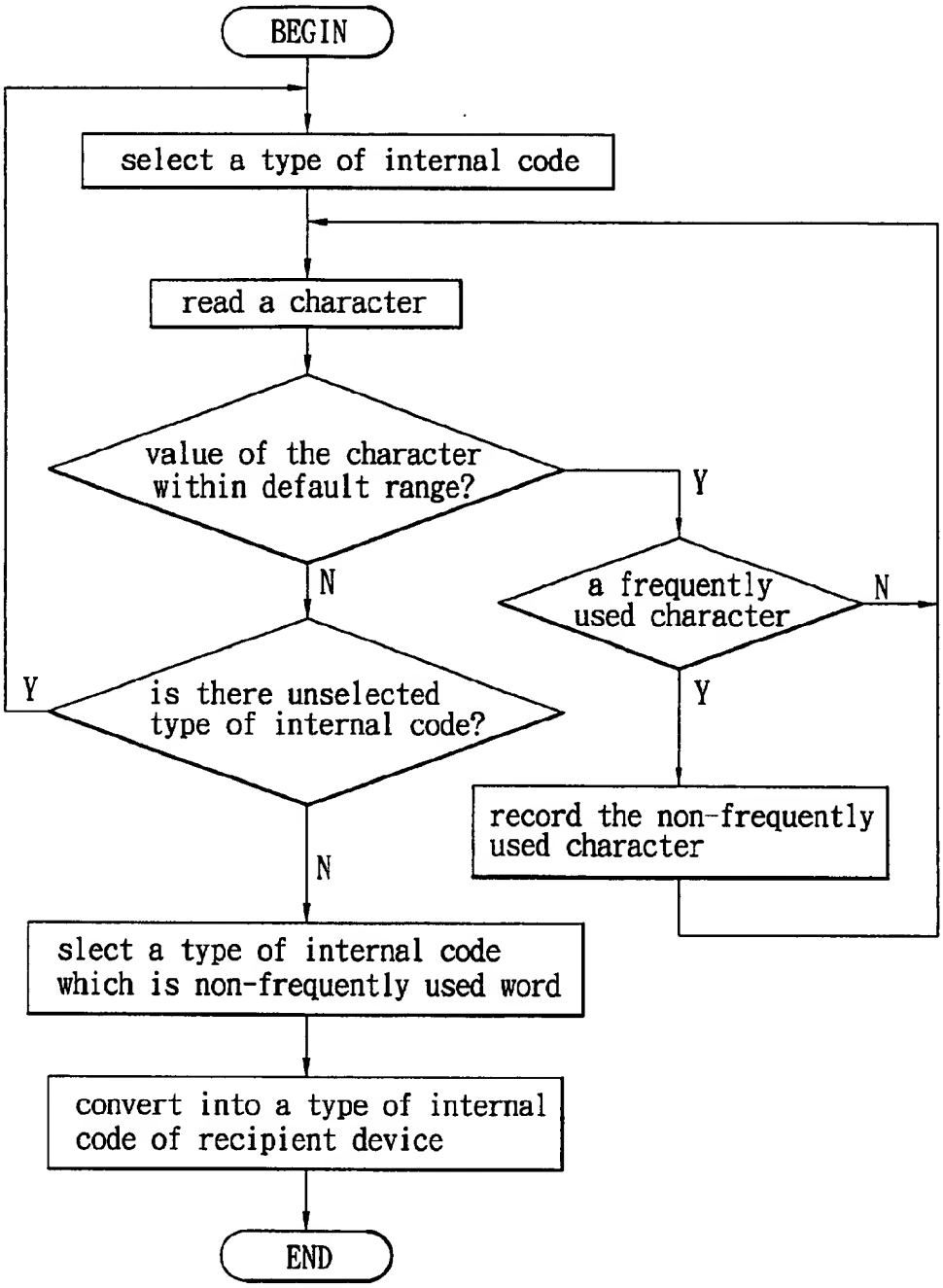

BEGIN
select a type of internal code
read a character
value of the character within default range?
Y
N
a frequently used character
N
Y
Y
is there unselected type of internal code?
record the non-frequently used character
N
slect a type of internal code which is non-frequently used word
convert into a type of internal code of recipient device
END

FIG. 3

INFRARED TRANSMISSION SYSTEM WITH AUTOMATIC CHARACTER IDENTIFICATION

FIELD OF THE INVENTION

[0001] The present invention relates to infrared transmission and more particularly to an infrared transmission system with automatic character identification.

BACKGROUND OF THE INVENTION

[0002] As technology progresses, data recording and storage have evolved from by pen and paper to by a digital device such as personal digital assistant (PDA), mobile phone, etc. Information related to our daily life and work may be stored by them. Also, information may be transmitted and exchanged by such digital devices. In general, transmission may be performed in a wired or wireless manner. As to most wired transmission cases, cable is employed as medium for interconnecting a variety of devices, thereby effecting data transmission and/or exchange. It is advantageous for its reliability and quality. However, it is disadvantageous for its poor compatibility and availability. As to most wireless transmission cases, infrared (e.g., IrDA) is employed as medium for effecting data transmission and/or exchange. It is advantageous for reliability, quality, compatibility, availability, and interconnection of various devices because the transmission protocol employed in wireless transmission is highly reliable. Hence, currently wireless transmission has been widely employed in a variety of commercial electronic products. However, problems also found after practical use. For example, programs and computer languages employed in different electronic devices may be different because various manufacturers use different design techniques. Hence, errors may occur when data is transmitted through wireless transmission (particularly infrared transmission) between two different devices having above design difference. Errors are caused by different internal codes and processing techniques. One example of such errors is random code as experienced in the transmission of Chinese information. As a result, useless information (i.e., random code) is received by a recipient. It is really inconvenient. Thus improvement requires.

SUMMARY OF THE INVENTION

[0003] It is an object of the present invention to provide an infrared transmission system with automatic character identification wherein in the process of identifying a selected type of internal code contained in information sent from a sender device, first check whether the value of each character contained in the sent information is within a default range of a specific internal code, discard all internal codes having values other than the default range, perform an conversion and an analysis on the qualified information based on the value of internal code thereof, select those less frequently appeared and qualified types of internal codes as the types of internal codes, and convert the received information into one having the type of internal code compatible to the recipient device.

[0004] In one aspect of the present invention, by utilizing the electronic devices in accordance with the system of the present invention in transmitting data, a minimized obstruction in information exchange is obtained. Also, the present invention can analyze the received information based on rules of various types of internal codes for identifying the type of internal code used by sender device, and perform a conversion on the information based on the type of internal code for preventing random codes from occurring, thereby showing the correct information at the recipient device.

[0005] In another aspect of the present invention, an information exchange between various devices, increased transportability and compatibility of infrared transmission, and errorless information communication between various portable electronic devices supporting software of different languages (i.e., types of internal codes) through infrared transmission are effected.

[0006] The above and other objects, features and advantages of the present invention will become apparent from the following detailed description taken with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] **FIG. 1** is a block diagram of an infrared transmission system with automatic character identification according to the invention;

[0008] **FIG. 2** is a schematic diagram illustrating data transmission process between sender and recipient through infrared devices; and

[0009] **FIG. 3** is a flow chart depicting the process of identifying internal code according to the invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0010] Referring to **FIGS. 1 and 2**, there is shown a block diagram of an infrared transmission system with automatic character identification and a schematic diagram illustrating a data transmission process between sender and recipient through infrared devices in accordance with the invention. The system is incorporated in a digital device having infrared transmission capability such as personal digital assistant (PDA), mobile phone, etc. The system comprises an infrared communication module **1**, a central processing module **2**, a storage module **3**, an analysis control module **4**, and a display module **5** wherein infrared communication module **1** acts to communicate with a sender device so as to receive information sent from sender through infrared transmission protocol and infrared device and maintain the integrity of information during transmission. Infrared device acts to effect a data communication, while infrared transmission protocol acts to effect a reliable information transmission. Central processing module **2** consists of a central processing unit (CPU) and associated circuitry. All calculation oriented processes are performed by central processing module **2**. Central processing module **2** performs a calculation based on instructions sent from analysis control module **4** and sends back the result to analysis control module **4**. Storage module **3** is used to store data required by analysis control module **4** when central processing module **2** performs a calculation. Storage module **3** is implemented as random access memory (RAM) and read only memory (ROM). RAM is used to store information related to control and calculation processes. ROM is used to store permanent data. Analysis control module **4** acts to analyze received data for identifying the type of internal code used and converts it into a type of internal code identifiable by the device of the

invention. Display module **5** acts to decode the type of internal code received from a recipient device and show the same. Hence, a recipient may understand information sent from sender. In the embodiment, display module **5** is a liquid crystal display (LCD).

[0011] In the embodiment, infrared communication module **1** sends information to analysis control module **4** after receiving the same from sender device. Then an instruction is sent to central processing module **2** by analysis control module **4** based on instructions and messages stored in the memory of storage module **3**. Next, central processing module **2** is commanded to perform a calculation, analysis and internal code conversion on the received information. As a result, the processed information sent from central processing module **2** through analysis control module **4** is shown on display module **5**. It is understood that in the embodiment, infrared devices are employed to establish a connection between sender and recipient. The sent information is packetized by an infrared transmission protocol (e.g., IrDA). Hence, recipient has to decode the packetized information by utilizing another infrared transmission protocol when information is received at infrared device from sender.

[0012] In general, an infrared transmission protocol is implemented as a variety of sub layers as shown in **FIG. 2** specifically. It is required that a specific format is employed by infrared transmission protocol in data communication. Hence, recipient device must know the correct internal code contained in information sent from sender device. Otherwise, the converted information in recipient device may be erroneous if there is an inconsistency between the type of internal code of sender device and that of recipient device. As a result, recipient can not obtain correct information from the shown random codes. For example, if Big5 code is employed in the traditional Chinese system at recipient device and ACSII is employed in the English system at sender device. It is designed that a code having a value larger than 127 is defined as a character of an European language other than English. As to Big5 code, a Chinese word consists of two ASCII characters. Further, it is possible for recipient device to process the received English characters as Big 5 characters, resulting an error. Such error is often found not only in the case of data transmission between two different languages but also in the case between two different internal code systems of the same language. For example, in the latter case random codes may be shown after information transmitted from a Big5 system to a Unicode system or vice versa. As such, it is required to implement an errorless identification procedure in the system in order to correctly decode the received information and obtain the decoded type of internal code.

[0013] As to identification of the type of internal code, a plurality of characteristics of internal code such as value of internal code, occurrence frequency, and combination rule are required to be analyzed. It is designed that an internal code has a default range of value. For example, the value of ASCII code is at the range between 0 and 127. Each of Big5 and GB code of Chinese consists of two bytes wherein the first byte has a value larger than 127. Also, each of first and second ASCII codes has a default range of value. Unicode consists of two ASCII codes. UTF-8 code is the processed Unicode and consists of one, two, three, or four ASCII codes. Also, each ASCII code of UTF-8 has a default range of value.

[0014] It is understood that most words transmitted in the system are frequently used. As to those non-frequently used words, it is rare for them to appear on the transmitted information. Further, information is expressed in the form of internal code. Hence, it is possible to identify the type of internal code of information from its value. However, it is also possible of erroneously identifying information because there is a superposition between two different types of internal codes. For example, each first ASCII character of Big5 and GB comprises a value between Oxbo and Oxf7. Further, each second ASCII character thereof comprises a value between Oxa1 and Oxfe. Hence, other characteristics of internal codes have to be also identified in order to obtain the correct information. In the system of the invention, the identification of selected type of internal code is based on the occurrence frequency of rarely or less frequently appeared words. In other words, the higher occurrence frequency of non-frequently used words the higher the possibility of error of the selected type of internal code. Otherwise, it is assumed to be correct.

[0015] In the process of identifying a selected type of internal code in the system, first check whether the value of each character contained in the sent information is within a default range of a specific internal code. All internal codes having values other than the default range are discarded. Then an conversion and an analysis are performed on the qualified information based on the value of internal code thereof. Next, those less frequently appeared and qualified types of internal codes are selected as the types of internal codes while discarding those frequently used words. Then the received information is converted into one having the type of internal code compatible to the recipient device. As a result, a correct information may be shown on display module **5**. In the above conversion process, a conversion table stored in storage module **3** is intensively used. Further, the larger the number of conversion tables the faster the conversion process. That is, the smaller the number of conversion tables the higher the number of conversion tables are used in the conversion, resulting in a prolonging of conversion process and decrease of conversion speed. In the system of the invention, conversion table is a value table with a variety of types of internal codes of a corresponding character and is stored in ROM. Preferably, a source code and a corresponding object code is the format implemented by the table for increasing the amount of data stored in memory and facilitating access.

Following is a table for converting Unicode into Big5:

source code	object code
Ox626d (扭)	Oxa7e1
Ox626e (扮)	Oxa7ea
Ox626f (扯)	Oxa7e8
...	...
Ox62d3 (拓)	Oxa9dd
Ox62d4 (拔)	Oxa9de
...	...

[0016] Chinese internal code is now classified as Big5, GB, Unicode, and ASCII codes. Also, various electronic devices utilizing infrared (e.g., IrDA) as transmission medium can support such internal codes. Hence, the inven-

tion can effect an identification of the type of internal code by utilizing any of above four Chinese internal codes, by connecting it with Chinese or English devices having infrared transmission capability, and by performing information transmission and exchange.

[0017] In the identification process with respect to the selected types of internal codes performed by the system of the invention, an identification table is established by RAM and following information is stored in the identification table: (1) all types of internal codes, (2) length of information corresponding to respective type of internal code, and (3) the number of non-frequently used words in the information corresponding to respective type of internal code. By identifying above information and in conjunction with the flow chart shown in **FIG. 3, a** correct type of internal code may be selected after performing the following analysis and identification.

[0018] The steps of the process are detailed below. First, sequentially select a type of internal code from the identification table. In a Chinese system, internal code is Big5, GB, Unicode, ASCII, or UTF-8 code (step **10**). Then sequentially read a character from the received information (step **20**). Next analyze the character in order to determine whether the value thereof is within the range of the selected type of internal code (step **30**). If yes, process goes to step **40**. Otherwise, process goes to step **50**. In step **40**, a determination is made whether the character is one of frequently used characters of the selected type of internal code. If yes, record the frequently used character (step **60**) and the process loops back to step **20** to read a next character. Otherwise, process goes back to step **20** to read a next character. In step **50**, a determination is made whether there is any of other types of internal codes not selected. If yes, the process loops back to step **10** to select another default type of internal code. If not, the process goes to step **70**. In step **70**, convert the information with respect to the various types of internal codes. Analyze the occurrence frequency of the recorded non-frequently used words. Select a type of internal code which is among the non-frequently used words and has a value within the value range of the type of internal code. The selected type of internal code is viewed as one that transmitted from sender device. Then convert the received type of internal code into one corresponding to the type of internal code of recipient device based on the conversion table (step **80**).

[0019] Following is a description of a preferred embodiment of the invention in which a PALM based PDA having infrared information exchange capability is employed. Such product can support Chinese. But most above products only have installed Chinese software. The core software of them is still English based one. Further, Unicode is implemented therein. Furthermore, a VCARD format is loaded into infrared transmission protocol for exchanging information. In the PDA embodiment of the system of the invention, a VCARD format document having following programs is received through an infrared transmission system in which name (e.g. 張三) and office telephone number of a user is sent in the system:

[0020] BEGIN: VCARD

[0021] VERSION: 1.0

[0022] N:CHARSET ISO-8859-1:張三

[0023] TEL; WORK; VOICE: 12345678

[0024] UID: 6725640

[0025] END: VCARD

[0026] where N is name written in English alphabets. TEL is office telephone number. BEGIN, END, UID, AND VERSION are system information generated by the PALM PDA not information about user. Hence, PDA may only decode user name and office telephone number after receiving the document. The decoded information is as follows:

[0027] User name: {OxB1 Ox69 OxA4 Ox54}.

[0028] Office telephone number: {Ox31 Ox32 Ox33 Ox34 Ox35 Ox36 Ox27 Ox38}.

[0029] It is found that there are two characters in the type of internal code of user name having values larger than 128 (e.g., OxB1 and OxA4). Further, the core software of PDA is still English based one. Furthermore, Unicode is implemented therein. Hence, the received VCARD document is processed as English document. In view of above, random codes may be generated if analysis and conversion are not performed in accordance with the system of the invention.

[0030] In the embodiment, the type of internal code (i.e., OxB1 Ox69 OxA4 Ox54) of user name are analyzed by the system of the invention after receiving information. It is concluded that user name is written in English. Further, OxB169 and OxA454 are not in the default value range of GB code. It is also concluded that the type of internal code of information is Unicode or Big5. Then analyze the same based on possible type of internal code in order to determine the corresponding words. The corresponding words are "棳託" wherein the first word is a non-frequently used one if Unicode conversion is employed. In comparison, the corresponding words are 張三if Big5 conversion is employed. It is seen that the occurrence frequency of non-frequently used words is relatively low if Big5 is employed to perform a conversion. It is concluded that Big5 is the type of internal code used by sender device. Hence, a correct information (e.g., user name) may be shown if a table for converting Big5 into Unicode is employed.

[0031] In the above embodiment, the type of internal code (Ox31 Ox32 Ox33 Ox34 Ox35 Ox36 Ox37 Ox38) of office telephone number are analyzed with respect to ASCII by the system of the invention. It is concluded that office telephone number is written in English since all values of the type of internal code are smaller than 128 (i.e., within the default information range of ASCII). Further, Ox3132, Ox3334, Ox3536 and Ox3738 are not in the default value range of Big5 and GB code (i.e., smaller than 128). It is also found that Ox3231, Ox3433, Ox3635 and Ox3837 are not complied with the rule of Chinese Unicode from 0x4e00 above. It is only found that ASCII is the complied one. In conclusion, ASCII is the type of internal code used by sender device. Hence, a correct information (e.g., office telephone number) may be shown if a table for converting ASCII into Unicode is employed.

[0032] In brief, the automatic character identification system of the invention can minimize the obstruction in information exchange, analyze the received information based on rules of various types of internal codes for identifying the type of internal code used by sender device, and perform a

conversion on the information based on the type of internal code for preventing random codes from occurring, thereby showing the correct information at the recipient device. This can effect information exchange between various devices, increase transportability and compatibility of infrared transmission, and carry out an errorless information communication between various portable electronic devices supporting software of different languages (i.e., types of internal codes) through infrared transmission.

[0033] While the invention has been described by means of specific embodiments, numerous modifications and variations could be made thereto by those skilled in the art without departing from the scope and spirit of the invention set forth in the claims.

What is claimed is:

1. An infrared transmission system for identifying a selected type of internal code contained in information sent from a sender device, a process in said system comprising:

checking whether said value of each character contained in said sent information is within a default range of a predetermined internal code;

discarding said internal code having value other than said default range;

performing an conversion and an analysis on said qualified information based on said value of said internal code thereof;

selecting said non-frequently used and qualified type of said internal code as said type of internal code;

converting said received information into one having said type of said internal code compatible to a recipient device; and

displaying said converted information at said recipient device.

2. The system of claim 1, wherein said infrared transmission system is implemented as an electronic device having an infrared transmission capability.

3. The system of claim 2, wherein said electronic device is a personal digital assistant.

4. The system of claim 2, wherein said electronic device is a mobile phone.

5. The system of claim 1, wherein said infrared transmission system comprises:

an infrared communication module for communicating with said sender device so as to receive information sent from the sender device through an infrared transmission protocol and an infrared device and maintain said integrity of said sent information, said infrared device being operable for effecting a data communication, and said infrared transmission protocol for effecting a reliable information transmission;

an analysis control module for analyzing said received information, for identifying said type of said internal code used, and converting it into a type of internal code identifiable by said recipient device;

a central processing module for performing a calculation oriented process based on instructions sent from said analysis control module and sending back said calculation result to said analysis control module;

a storage module for storing data required by said analysis control module when said central processing module performs a calculation, said storage module being implemented as random access memory (RAM) and read only memory (ROM), said RAM being operable to store information related to a control and a calculation processes and said ROM being operable to store permanent information; and

a display module for decoding and showing said type of said internal code received from said recipient device.

6. The system of claim 5, wherein said display module is a liquid crystal display (LCD).

7. The system of claim 5, further comprising a conversion table in said ROM for converting said received information into one having said type of said internal code compatible to said recipient device.

8. The system of claim 7, further comprising an identification table in said RAM for storing:

all said types of internal codes;

said length of said information corresponding to said respective type of said internal code; and

said number of non-frequently used words in said information corresponding to said respective type of said internal code.

9. The system of claim 8, wherein said identification table utilizes said stored information for performing the steps of:

(a) sequentially selecting a type of internal code from said identification table;

(b) sequentially reading a character from said received information;

(c) analyzing said character in order to determine whether said value thereof is within said range of said selected type of said internal code;

(d) determining whether said character is one of frequently used characters of said selected type of said internal code;

(e) recording said frequently used character if the result in said step (d) is positive and looping back to said step (b) irrespective of said result in said step (d);

(f) determining whether there is any of said unselected type of said internal code and looping back to said step (a) if said result is positive; and

(g) converting said information with respect to said types of said internal codes, analyzing said occurrence frequency of said recorded non-frequently used words, selecting said type of said internal code which is among said non-frequently used words and has a value within said value range of said type of said internal code, and converting said received type of said internal code into one corresponding to said type of said internal code of said recipient device based on said conversion table.

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